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Applicants: NIK MULTIMEDIA, INC.  
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Title: Selective Noise Reduction and Enhancement of Digital Images  
Examiner: John B. Strege

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REPLY TO WRITTEN OPINION AND ARTICLE 34 AMENDMENT

Dear Sir:

This is a Reply and Article 34 Amendment, in reply to the Written Opinion dated 26 November 2004. Please amend the claims as follows. Replacement pages are attached.

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## IN THE CLAIMS

1. (currently amended) A method for image processing of a digital image (38) comprising pixels having characteristics, comprising applying an image processing filter (17) as a function of the correspondence between the characteristics of each pixel to be processed, and a first set of target image characteristics, a first received adjustment parameter associated with the first set of target image characteristics, and a second set of target image characteristics, and a second received adjustment parameter associated with the second set of target image characteristics.

2. (currently amended) ~~A method for image processing of a digital image (38) comprising pixels having characteristics, comprising the steps of:~~  
~~providing an image processing filter (17);~~  
~~receiving first target image characteristics;~~  
~~receiving second target image characteristics;~~  
~~determining for each pixel to be processed, the correspondence between the characteristics of that pixel and the first target image characteristics and second target image characteristics; and~~  
~~processing the digital image by applying the image processing filter as a function of the determined correspondence between each pixel and the first target image characteristics and second target image characteristics.~~

The method of claim 1, where either the first set of target image characteristics, or the second set of target image characteristics, or both, are received.

3. (original) The method of claims 1 or 2, wherein the image processing filter is a noise reduction filter, a sharpening filter, or a color change filter.

4. (currently amended) The method of claims 1 or 2, further comprising receiving an ~~adjustment parameter~~ one or more third sets of target image characteristics, and one or more third adjustment parameters, each of the third adjustment parameters being associated with one of third sets of target image characteristics, and wherein the application of the image processing filter is also a function of the one or more third sets of target image characteristics, and the associated third adjustment parameters.

5. (currently amended) The method of ~~claim 4~~ claims 1 or 2, where either, or both, of the received adjustment parameters is an opacity parameter or a luminosity parameter.

6. (currently amended) The method of ~~claim 4~~ claims 1 or 2, further comprising the step of providing a graphic user interface for receiving the first set of target image characteristics, the

second set of target image characteristics, ~~and the first adjustment parameter, and the second adjustment parameter.~~

7. (currently amended) The method of claim 6, where the graphic user interface for receiving either of the adjustment parameters comprises a slider.

8. (currently amended) The method of claims 1 or 2, wherein the first set of target image characteristics, or the second set of target image characteristics, are comprises an image coordinate, a color, or an image structure.

9. (canceled) ~~The method of claim 2, further comprising the step of providing a graphic user interface for receiving the first target image characteristics and the second target image characteristics.~~

10. (currently amended) The method of ~~claim 9~~ claim 6, where the graphic user interface comprises indicia representing target image characteristics.

11. (currently amended) The method of ~~claim 9~~ claim 6, where the graphic user interface comprises a tool to determine the pixel characteristics of an image pixel.

12. (currently amended) The method of claims 1 or 2, further comprising the step of providing camera-specific default settings.

13. (currently amended) An application program interface embodied on a computer-readable medium (106) for execution on a computer (34) for image processing of a digital image (38), the digital image comprising pixels having characteristics, comprising:

a first interface to receive a first set of target image characteristics;

a second interface to receive a second set of target image characteristics;

a third interface to receive a first adjustment parameter ~~corresponding to~~ associated with the first set of target image characteristics; and

a fourth interface to receive a second adjustment parameter ~~corresponding to~~ associated with the second set of target image characteristics.

14. (currently amended) The application program interface of claim 13, further comprising a fifth interface comprising indicia representing the first set of target image characteristics, and a sixth interface comprising indicia representing the second set of target image characteristics.

15. (original) The application program interface of claim 13, further comprising a tool to determine the pixel characteristics of an image pixel.

16. (original) The application program interface of claim 13, where the third interface and the fourth interface each comprise a slider.

17. (currently amended) A system (100) for image processing of a digital image (38), the

digital image comprising pixels having characteristics, comprising:

- a processor (102),
- a memory (104) in communication with the processor, and
- a computer readable medium (106) in communication with the processor, the computer readable medium having contents for causing the processor to perform the steps of:
  - receiving a first set of target image characteristics;
  - receiving a first adjustment parameter associated with the first set of target image characteristics;
  - receiving a second set of target image characteristics;
  - receiving a second adjustment parameter associated with the second set of target image characteristics;
  - determining for each pixel to be processed, the correspondence between the characteristics of that pixel, ~~and the first set of target image characteristics~~, and second set of target image characteristics; and
  - processing the digital image by applying the image processing filter as a function of the determined correspondence ~~between each pixel and the first target image characteristics and second target image characteristics~~, the first received adjustment parameter, and the second received adjustment parameter.

18. (currently amended) The system of claim 17, the computer readable medium further having contents for causing the processor to perform the steps of receiving a ~~first adjustment parameter corresponding to the first target image characteristics and receiving a second adjustment parameter corresponding to the second target image characteristics~~ one or more third sets of target image characteristics, and one or more third adjustment parameters, each of the third adjustment parameters being associated with one of the third sets of target image characteristics, and the processing step further comprising applying the image processing filter as a function of the one or more third sets of target image characteristics, and the one or more associated third adjustment parameters.

19. (original) The system of claim 17, further comprising a set of camera-specific default instructions embodied on a computer-readable medium for execution on a computer.

20. (original) A set of camera-specific default instructions embodied on a computer-readable medium (106) for execution on a computer (34) for image processing of a digital image (38), using the method of claim 1 or 2.

21. (original) A set of camera-specific default instructions for setting the state of the application program interface of claim 13, embodied on a computer-readable medium (106)

for execution on a computer.

22. (currently amended) ~~A method for image processing of a digital image (38) comprising pixels having characteristics~~ The method of claim 1, comprising applying an ~~the image~~ processing filter (17) as a function of ~~the correspondence between each pixel, the received target image characteristic, and the input received from a user pointing device (36).~~

23. (currently amended) ~~A method for image processing of a digital image (38) comprising pixels having characteristics;~~ The method of claim 2, further comprising the steps of:

~~providing an image processing filter (17);~~

~~receiving a target image characteristic;~~

~~receiving a coordinates from a user pointing device (36);~~

~~determining for each pixel to be processed, the correspondence between the characteristics of that pixel, the target image characteristic, and the received coordinates; and~~

~~processing the digital image by applying the image processing filter as a function of the determined correspondence between each pixel, the target image characteristic, and the received coordinates.~~

further comprising applying the image processing filter as a function of the received coordinates.

24. (original) The method of claims 22 or 23, wherein the image processing filter is a noise reduction filter, a sharpening filter, or a color change filter.

25. (currently amended) The method of claim 23, further comprising the step of providing a graphic user interface ~~for receiving the target image characteristic.~~

26. (currently amended) The method of claim 25, where the graphic user interface comprises indicia representing one or more ~~the~~ target image characteristics.

27. (currently amended) The method of claims 22 or 23, wherein one or more ~~the~~ target image characteristics is an image coordinate, a color, or an image structure.

28. (currently amended) ~~An application program interface embodied on a computer readable medium (106) for execution on a computer (34) for image processing of a digital image (38), the digital image comprising pixels having characteristics;~~ The application program interface of claim 13, further comprising:

~~a first interface to receive a target image characteristic; and~~

~~a second~~ seventh interface to receive a ~~coordinate~~ input from a user pointing device (36).

29. (currently amended) ~~A system (200) for image processing of a digital image (38), the~~

~~digital image comprising pixels having characteristics;~~ The system of claim 17, further comprising:

~~a processor (102);  
a memory (104) in communication with the processor;  
a user pointing device (36), and  
a computer-readable medium (106) in communication with the processor, the computer-readable medium further having contents for causing the processor to perform the steps of:~~

~~receiving a target image characteristic;  
receiving coordinates from the user pointing device;  
determining for each pixel to be processed, the correspondence between the characteristics of that pixel, the target image characteristic, and the received coordinates; and  
processing the digital image by applying the image processing filter as a function of the determined correspondence between each pixel, the target image characteristic and received coordinates.~~

30. (new) The method of claims 1 or 2, where the first set of target image characteristics, or the second set of target image characteristics, or both, comprises a single target image characteristic.

31. (new) The method of claims 1 or 2, where the first set of target image characteristics, or the second set of target image characteristics, or both, comprises two or more target image characteristics.

## REMARKS

This is a Reply and Article 34 Amendment in response to the Written Opinion of November 26, 2004. There were 29 claims pending in this application, and by this Amendment claims 30 and 31 have been added. Replacement sheets for the claims accompany this Reply.

The Examiner has indicated that claims 1-6; 8-10, 13-14; 17-18; 20, 22-25 and 27-29 lack novelty under PCT Article 33(2) as being anticipated by Gupta, USPN 6,204,858. The Examiner has indicated that claims 1-6; 8-10, 13-14; 17-18; 20, 22-25 and 27-29 lack an inventive step under PCT Article 33(3) as being obvious over Gupta, in view of Bar et al. USPN 5,506,946.

In Box V(1), the Examiner indicated that all 29 claims meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry. In Box V(2), however, the Examiner only referred to Claim 1-21 as meeting this criteria. Applicant assumes that this was a typographical error, and requests that the Examiner correct this in the IPER.

## AMENDMENT UNDER ARTICLE 34

In response, Claims 1-2, 4-8, 10-14, 17-18, 22-23, 25-29 have been amended, claim 9 has been cancelled, and new claims 30 and 31 have been added. There are now three remaining independent claims, claim 1 drawn to a method, claim 13 drawn to an application program interface, and claim 17 drawn to a system.

### Gupta USPN 6,204,858

Gupta discloses a method for automatically detecting and adjusting the color of what is commonly called the "red-eye effect". The method taught in Gupta can be summarized as follows:

1. *Selection.* The user selects a region of interest (ROI), which includes a red-eye area. The entire image may be selected. (Step 410)  
This is the only input received from the user (unless optional step 3 is used)
2. *Identification.* Candidate areas within the ROI are automatically identified. (Step 420)
3. *Verification.* Optionally, the candidate area may be presented to

the user for verification. (Step 430)

4. *Process.* Acting only within the candidate areas, the image is processed to remove the red-eye effect.

During the identification step, Gupta uses a combination of color characteristics and shape characteristics to identify candidate areas for red-eye reduction.

Gupta does not, however, either alone or in combination with Bar et al. USPN 5,506,946, disclose or fairly teach a method for image processing of a digital image comprising applying an image processing filter as a function of the characteristics of each pixel to be processed, a first set of target image characteristics, a first received adjustment parameter associated with the first set of target image characteristics, a second set of target image characteristics, and a second received adjustment parameter associated with the second set of target image characteristics.

Gupta addresses the problem of automatically determining the smallest possible selection area, on which to apply the filter. As shown in Figure 1, one embodiment of the selective application matrix (SAM) of the present invention, however, gives the user the ability to define selection areas in a wholly new way, through the interaction of a plurality of controllers, where each controller comprises both a set of target image characteristics (represented by a set of icons), and an adjustment parameter that is received from the user. As explained in the detailed description:

“With reference to Figure 1, each SAM controller in that embodiment is represented by a set of icons and a slider for the adjustment parameter. Each of the SAM controllers is accompanied by one or more fields (1.1, 1.2 and 1.3) that can represent target image characteristics. In Figure 1, icon 1.1 represents a color, icon 1.2 represents an image structure, and icon 1.3 holds an image coordinate. In one embodiment, the color can be a RGB value, a structure can be a value derived from the difference of adjacent pixels (such as the mean luminosity difference of horizontally adjacent pixels, or local wavelet, or Fourier components), and an image coordinate could be an X and a Y coordinate.” (p. 7, l. 26 – p. 8, l. 1)

In the embodiment shown in Figure 1, the set of target image characteristics comprises three characteristics, which are concurrently used as parameters to define the selection, as modulated by the adjustment parameter received from the user.

Further, in the embodiments shown in Figures 1, 2, and 4, the set of target image



characteristics are all received from the user, as claimed in claim 2. *This is in further distinction from Gupta, in which the colors and characteristics used are predetermined.*

#### Claim 1

Claim 1 has been amended to better point out and distinctly claim that target image characteristics form sets, with associated received adjustment parameters. Support for the new claim language is found in the drawings, Figures 1, 2, and 4, and the detailed description as explained above.

#### Claim 2

Claim 2 has been amended to depend from claim 1, and to better point out and distinctly claim the embodiments shown in the drawings of Figures 1, 2, and 4, where the various sets of image characteristics are received.

#### Claim 4

Claim 4 has been amended to better point out and distinctly claim one or more received third sets, each with associated adjustment parameters.

#### Claims 5-8

Claims 5-8 have been amended to better point out and distinctly claim the embodiments consistent with the above remarks.

#### Claim 9

Claim 9 has cancelled in view of claim 6.

#### Claims 10-14, and 17

Claims 10-14, and 17 have been amended to better point out and distinctly claim the embodiments consistent with the above remarks.

#### Claim 18

Claim 18 has been amended to better point out and distinctly claim the embodiments consistent with the above remarks, for one or more third sets, each with associated adjustment parameters.

**Claim 22**

Formerly independent Claim 22 has been amended to depend from claim 1.

**Claim 23**

Formerly independent Claim 23 has been amended to depend from claim 2.

**Claims 25-27**

Claims 25-27 have been amended to better point out and distinctly claim the embodiments consistent with the above remarks.

**Claim 28**

Formerly independent Claim 28 has been amended to depend from claim 13.

**Claim 29**

Formerly independent Claim 29 has been amended to depend from claim 17.

**New Claim 30**

New claim 30 has been added as a dependent claim from claims 1 or 2. Support for the set of target image characteristics comprising a single target image characteristic is found in Figures 2 and 4.

**New Claim 31**

New claim 31 has been added as a dependent claim from claims 1 or 2. Support for the set of target image characteristics comprising two or more target image characteristics is found in Figure 1.

**CONCLUSION**

The prior art, either alone or in combination, does not disclose or fairly teach a method for image processing of a digital image comprising applying an image processing filter as a function of the characteristics of each pixel to be processed, a first set of target image characteristics, a first received adjustment parameter associated with the first set of target image characteristics, a second set of target image characteristics, and a second received adjustment parameter associated with the second set of target image characteristics.

Also, the prior art, either alone or in combination, does not disclose or fairly teach a

method for image processing of a digital image comprising applying an image processing filter as a function of the characteristics of each pixel to be processed, a first set of target image characteristics with an associate first adjustment parameter, a second set of target image characteristics with an associated second adjustment parameter, where the sets of image characteristics and adjustment parameters are all received from a user or operator.

Accordingly, the Examiner is requested to indicate that all claims meet the criteria set out in PCT Articles 33(2), 33(3), and 33(4).

No fee is believed due in connection with this communication. However, if any fee is determined to be due, The United States International Preliminary Examining Authority is authorized to deduct any fee due in connection with this request from Deposit Account No. 19-2090.

Respectfully submitted,  
SHELDON & MAK PC

Date: 1/29/05

By: Robert J. Rose

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